The co-occurrence of PTSD and dissociation: differentiating severe PTSD from dissociative-PTSD

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The co-occurrence of PTSD and dissociation: differentiating severe PTSD from dissociative PTSD.

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Abstract

Purpose: A dissociative-PTSD subtype has been included in the DSM-5. However, it is not yet clear whether certain socio-demographic characteristics or psychological/ clinical constructs such as comorbid psychopathology differentiate between severe PTSD and dissociative-PTSD. The current study investigated the existence of a dissociative-PTSD subtype and explored whether a number of trauma and clinical covariates could differentiate between severe PTSD alone and dissociative-PTSD.

Methods: The current study utilized a sample of 432 treatment seeking Canadian military veterans. Participants were assessed with the Clinician Administered PTSD Scale (CAPS) and self-report measures of traumatic life events, depression, and anxiety. CAPS severity scores were created reflecting the sum of the frequency and intensity items from each of the 17 PTSD and three dissociation items. The CAPS severity scores were applied to latent profile analysis (LPA) to investigate the existence of a dissociative-PTSD subtype. Subsequently, several covariates were added to the model to explore differences between severe PTSD alone and dissociative-PTSD.

Results: The LPA identified five classes: one of which constituted a severe PTSD group (30.5%), and one of which constituted a dissociative-PTSD group (13.7%). None of the included, demographic, trauma, or clinical covariates were significantly predictive of membership in the dissociative-PTSD group compared to the severe PTSD group.

Conclusions: In conclusion, a significant proportion of individuals experience high levels of dissociation alongside their PTSD, which constitutes a dissociative-PTSD subtype. Further investigation is needed to identify which factors may increase/decrease the likelihood of membership in a dissociative-PTSD subtype group compared to a severe PTSD only group.

Key words: Posttraumatic Stress Disorder; Dissociation, Dissociative subtype, CAPS, LPA, Veterans, Canadian

Introduction

The occurrence of dissociative symptoms in the wake of a traumatic experience has been a topic in the scientific literature for more than a century [1]. In recent decades, most studies have found dissociation to be significantly related to PTSD [2], but the nature of this relationship remains a source of controversy. Indeed, even though dissociation is considered a salient feature in the early phase of reactions to trauma (as outlined in the criteria for Acute Stress Disorder), [3], and has been found to predict PTSD-severity, the strength of the association between peritraumatic dissociation and PTSD is modest. It has therefore been argued that dissociation might not be integral to PTSD symptomatology [4-6].

Recent research on trauma and dissociation has focused on identifying a dissociative-PTSD subtype by classifying individuals with PTSD into groups based on their level of dissociation [7-12]. For example, Putnam et al. [11] reported that mean dissociation scores among individuals with PTSD were carried by a small proportion of individuals displaying high levels of dissociation, rather than by evenly distributed levels of dissociation among the whole sample. Waelde, Silvern, and Fairbank [12] applied a taxometric approach to classify trauma-exposed Vietnam veterans into groups of high or low dissociation and found that 32% of those with PTSD could be classified as belonging to a high-dissociation taxon.

More recently, Wolf et al. [7] applied latent profile analysis (LPA) to investigate potential dissociative subclasses in a sample of 492 veterans and their spouses. The authors found evidence for a three-class solution: a low severity group, a high PTSD severity group, and a small but distinct dissociative-PTSD group; the latter encompassing 6% of the sample [8]. Based on this, the authors suggested that dissociation is a prominent feature of PTSD, but only in a subset of individuals. In a replication and extension of this study, Wolf et al. [8] conducted LPA in two different trauma samples: a sample of 360 male veterans and a sample of 284 female veterans. The authors replicated their original findings of three distinct classes; one of them defined as a

dissociative-PTSD subtype in both samples with 15% belonging to the dissociative subtype in the all-male sample and 30% belonging to the dissociative subtype in the all-female sample.

Another recent study applying the same methodology, investigated the potential existence of a dissociative subtype, on a relatively small sample (*N*=134), with PTSD primarily related to childhood abuse [9]. This study also found evidence for three latent classes. One of these supported the existence of a dissociative-PTSD subtype encompassing 25% of the total sample. In this analysis, the reduced awareness item of dissociation was excluded, and hence the distinction of the dissociative subgroup from the other groups was made based on the dissociative symptoms of derealization and depersonalization alone; however this is in-line with the current DSM-5 criteria.

Prior research providing evidence in favor of a dissociative-PTSD subtype has revealed a pattern of severe PTSD in members of the dissociative subgroup. Notably, these studies often find a relatively comparable class of individuals who also experience severe PTSD but do so in the absence of high levels of dissociation [7, 8,12,]. Thus, an important avenue for research is the investigation into external correlates and how they may be able to differentiate between individuals experiencing severe PTSD with and without high dissociation.

Wolf et al. [7] investigated whether differences existed between a low PTSD severity group, a high PTSD severity group, and a small but distinct dissociative-PTSD group, in relation to several demographic and trauma exposure variables. They concluded that there were no statistically significant differences between a dissociative-PTSD group and a high PTSD severity group with respect to any of the assessed demographics including ethnicity, race, and sex. They did however; conclude that those in the dissociative group reported more childhood and adulthood experiences of sexual abuse compared to those in high PTSD severity group.

Wolf et al. [8] assessed group differences, again across three groups; high PTSD and dissociation, high PTSD, and Moderate PTSD in relation to demographics, trauma exposure, and Personality Disorders (PDs) in both an all-male and an all-female sample. They concluded that there were no statistically significant differences between groups in the all-male sample. However,

the dissociative group in the all-female sample reported a higher rate of co-morbid PD, and belonging to a racial minority. In agreement with the all-male sample, there were no group differences related to severity of combat exposure; nor were there group differences related to exposure to sexual trauma. The latter perhaps surprising given previous evidence linking sexual assault with dissociation [cf. 13,14] and Wolf et al's [8] earlier finding that members of a dissociative group reported more childhood and adulthood experiences of sexual abuse/assault. Indeed, the authors proposed that the absence of such a finding may be attributable to an extremely high base rate of sexual assault in the female only sample.

Extending this line of research further, Steuwe and colleagues [9], in assessing group differences with respect to demographics, trauma history, and Axis I disorders, reported that sex resulted in the only significant difference between groups. Unfortunately, they were not clear in relation to whether sex differed in the dissociative-PTSD group compared to the high PTSD only group. Rather they stated that both high PTSD groups differed with females being more prevalent compared to the moderate PTSD group. With respect to trauma history the authors reported that members of the dissociative-PTSD group reported higher scores related to physical and sexual abuse as compared to the high PTSD only group. Likewise, number of present diagnoses, and comorbidity with major depression and specific phobia, was more likely to be exhibited by the dissociative-PTSD group compared to the high PTSD only group.

The current research is pertinent given the inclusion of a dissociative-PTSD subtype in the recently published DSM-5. To qualify for a diagnosis of PTSD with dissociative symptoms, individuals must first meet the full diagnostic criteria for PTSD then additionally report high levels of depersonalization and derealization in response to trauma related stimuli [15]. The inclusion of a diagnostic category of PTSD with dissociative symptoms in the DSM-5 was based on accumulating evidence supporting a subtype model of PTSD [16,17]. Indeed, for a comprehensive discussion of the various models put forth to explain the trauma, dissociation, and PTSD associations and why the subtype model is preferential over other models such as the comorbidity model please consult

Dalenberg and Carlon [17]. Please note however, the use of the term-subtype is in the non-traditional sense of the word; given that the subtype is not defined by differences across core PTSD symptoms, rather it is defined by the additional presence of two dissociative symptoms. Notably, despite growing evidence for a dissociative subtype, much less is known regarding which factors which differentiate between severe PTSD and a dissociative-PTSD subtype.

The aims of the current study were twofold; first to investigate the existence of a dissociative-PTSD subtype via latent profile analysis [LPA; 18]. LPA is a method for categorizing individuals into latent subgroups based on continuous scores. Thus, LPA classifies individuals into latent classes without a priori hypothesis about the number of classes or the criteria of endorsement for belonging to each class. Second, we wished to explore and evaluate the associations between the dissociative-PTSD subtype and a number of trauma and clinical covariates compared to a subgroup experiencing severe PTSD only.

Based on these aims, we hypothesized that we would uncover a minor, distinct class of individuals with high levels of dissociative symptoms. Based on previous studies [7-9] we hypothesized that these individuals would have severe PTSD symptomatology. We also hypothesized that clinical covariates [i.e., depression and anxiety, 9] and the experience of certain traumas, especially those related to sexual assault [8], would increase the likelihood of belonging to the dissociative-PTSD group compared to a subgroup experiencing severe PTSD only.

Methods

Participants and Procedure

The data presented here are based on the results of a retrospective file review of data gathered in the context of a clinical assessment. The study was approved by the appropriate ethics committee and has been performed in accordance with the 1964 Declaration of Helsinki and its later amendments. Data were collected from 471 participants who were referred to Veterans Affairs Canada or to a community mental health clinic for a comprehensive psychiatric assessment. All participants were evaluated by the same clinician (co-author, J.D. Richardson). Prior to the study all

veterans were assessed for cognitive impairment using the Mini Mental Status Examination or the Montréal Cognitive Assessment and using the 'Clock Diagram'. Thirty nine participants were not administered the CAPS due to their level of cognitive impairment thus were subsequently excluded from the current analysis. Our effective sample size was 432 participants.

The majority of participants were male (*n* = 406; 94%), and ranged in age from 24 to 93 (*M* = 54, *SD* = 19.04). The majority was married (*n* = 329; 76.5%). Over half of the sample (*n* = 295; 68.4%) served as peacekeeping veterans, whereas 25.3% (*n* = 109) served in World War II, and 6.3% (*n* = 27) served in the Korean War. The number of participant deployments ranged from 0 to 7 (M = 1.57; SD = 1.28).

Demographics

Several demographic and military variables were queried within the questionnaire as detailed above.

The Life Events Checklist [LEC; 19]

Trauma exposure was assessed via the LEC, a self-report measure assessing participant exposure to 16 specific and potentially traumatic events that qualify as criterion A1 traumas within the DSM-IV nosology. The LEC items are based on a 5-point nominal scale (e.g., 1 = *happened to me*; 2 = *witnessed it*; 3 = *learned about it*; 4 = *not sure*; and 5 = *does not apply*). Participants were deemed to have positively endorsed a trauma experience if they choose any of response options 1-3. Gray et al. (2001) previously reported high test-retest reliability (mean kappa coefficient of direct exposure items = .61, and indirect exposure items = .41). Additionally, Gray et al. [20] demonstrated that the LEC has good convergent validity with alternative trauma exposure measures. Participants endorsed several trauma experiences (see Table 1 for details). The most commonly endorsed traumas included warzone exposure (*n* = 349; 80.8%), transportation accidents (*n* = 341; 78.9%), unexpected death of someone close (n = 327; 75.7%), fire or explosion (*n* = 325;

75.2%), and severe human suffering (*n* = 319; 73.8%). Full PTSD diagnostic criteria were met by 63.9% (*n* = 276) of the current sample. The Office of Research Ethics at the University of Western Ontario provided Institutional Review Board approval for the use of this data in the current study.

The Clinician Administered PTSD Scale [CAPS; 19]

The CAPS is a structured clinician administered PTSD instrument that measures the frequency and intensity of the 17 PTSD symptom criteria outlined by the *DSM-IV*. In addition, the CAPS measures five associated symptoms (guilt over acts, survivor guilt, reduction in awareness, depersonalization, and derealization). The latter three symptoms are indicators of dissociative experiences. Frequency items have five response options ranging from 0 (not at all) to 4 (almost every day). Intensity items also have five response options ranging from 0 (none) to 4 (extreme). Several scoring practices are available [cf. 21]. If an item has a frequency score of 1 or more, and an intensity score of 2 or more, it is considered positively endorsed. If an individual positively endorses 1 intrusion, 3 avoidance/numbing, and 2 arousal items they meet the *DSM-IV* diagnostic criteria for PTSD's symptom clusters. This scoring system was used to determine the prevalence of probable PTSD in the current study. Overall item severity scores were created by summing corresponding frequency and intensity items. The CAPS has been shown to have excellent inter-rater reliability, convergent validity, and internal consistency (Weathers, Keane, & Davidson, 2001). The internal consistency of the CAPS item severity scores in the current study was high (Cronbach's alpha coefficient = .89).

The Beck Anxiety Inventory [BAI; 22]

The BAI is a 21-item self-report instrument of anxiety experienced over the past week. The BAI has five response options ranging from 0 (not at all) to 4 (severely). High scores equal high levels of anxiety with scores of 16 or over indicating moderate to severe levels of anxiety. Several studies have reported excellent test-retest reliability, and internal consistency [cf.,

22,23]. Furthermore, the BAI has been shown to provide moderate to strong correlations with other anxiety measures (Beck, Epstein et al. 1988). The internal consistency of the BAI was high in the current study (Cronbach's alpha coefficient = .93).

The Hamilton Depression Scale [HAM-D: 24]

The HAM-D is a 21-item clinician rated instrument of depression. The HAM-D has two response formats, in that eight items are rated on a 5-point Likert scale ranging from 0 (absent) to 4 (severe), and nine items are rated on a 3-point Likert scale ranging from 0 (none) to 2 (definite presence). High scores equal high levels of depression, however scores are created by summing the first 17 items only. Scores of 15 or over indicate moderate to severe levels of depression. The scale has been shown to have high inter-rater reliability reaching .90, and high internal consistency reaching .92 [25,26]. The HAM-D scale provides high correlation coefficients with alternative clinician rated depression measures [27]. The internal consistency of the HAM-D was high in the current study (Cronbach's alpha coefficient = .84). In the current study HAM-D items were used to assess past month symptomatology.

Analysis

Nominal amounts of CAPS missing item-level data were present (2-3 items each). Thus, maximum likelihood (ML) estimation procedures [28] were implemented in favour of list-wise deletion. The 20 PTSD and dissociation item severity scores were used in a Latent Profile Analyses (LPA).

Latent Profile Analysis

All analyses were conducted using Mplus 7 software [29,30]. LPA is a technique analogous to latent class analysis (LCA) however the former employs continuous data whereas the latter employs categorical data. In the current study the continuous indicators were the 20 CAPS

items covering posttraumatic and dissociative symptomatology. LPA is an exploratory, iterative technique, which uncovers underlying homogeneous groups within an overarching sample [31,32]. Muthen [33,34] notes that colinearity can be problematic when inter-item correlations are extremely high, for example in excess of .60. Only five inter-item correlations, of the full correlation matrix of the 20 indicators in the current study, exceeded .60 (Psychological and physiological cue reactivity = .72; psychological reactivity and intrusive recollections = .70; detachment or estrangement and diminished interest in activities = .66; restricted range of effect and diminished interest in activities = .63; and detachment or estrangement and restricted range of effect = .69). Thus, suggesting that colinearity is not problematic.

We specified and estimated latent class models of increasing size until reaching a point whereby additional classes were no longer necessary. Models were estimated employing the default robust maximum likelihood (MLR) estimator. Latent models were evaluated for optimal fit using a series of statistical fit indices including the Akaike Information Criteria [AIC: 35], the Bayesian Information Criterion [BIC: 36], the sample size adjusted BIC [SSABIC: 37] the bootstrapped Lo-Mendell-Rubin adjusted likelihood ratio test [BSLRT; 38], and the Entropy statistic [39]. Lower values of the AIC, BIC, and SSABIC indicate superior fitting models. The BSLRT evaluates whether a latent model with one additional class is superior to a latent model with one less class. A non-significant BSLRT value ($p < .05$) for a particular latent class model indicates that adding the additional class is not supported by the data compared to a more parsimonious model with one less class. Entropy is a measure of classification. Values range from 0-1; those which approach 1 indicate a higher certainty in classification.

Latent Profile Covariates (Multi-nominal Logistic Regression)

After the selection of the optimal class solution as indicated by the above mentioned fit statistics we added a number of covariates to the model; demographics (sex, 0 = male; 1 = female & marital status, 0 = not married; 1 = married), five trauma experiences (1.Physical assault;

2.Assaulted with a weapon [i.e., being shot, stabbed, threatened with a knife, gun, or bomb]; 3. Sexual assault [i.e., attempted rape or made to perform any type of sexual act through force or threat of harm]; 4. Other unwanted or uncomfortable sexual experience; 5. Combat or exposure to a war zone [in the military or as a civilian], not endorsed = 0; endorsed = 1) and continuous indicators of depression, (HAM-D scores) and anxiety (BAI scores). Our aim was to determine if certain covariates could differentiate between latent classes characterized by severe PTSD only and severe PTSD and dissociative symptomatology.

Results

As noted above, the criterion for PTSD as outlined in the DSM-IV was met by 63.9% (*n* = 276) of the current sample. Based on an assessment of severity scores the symptoms which were more commonly endorsed within the current sample were psychological distress at exposure to cues (endorsed by 94.9%) closely followed by sleeping difficulties (94.0%) and avoidance of thoughts or feelings (91.2%). In relation to dissociative psychopathology and based on the CAPS scoring rule that individuals must choose a response option of 1 or greater for frequency and 2 or greater for intensity, 64.5% (*n* = 272) met the criteria for 'reduction in awareness', 28% (*n* = 118) met the criteria for 'derealization', and 16.2% (*n* = 68) met the criteria for 'depersonalization'. Again based on item severity scores, the most commonly endorsed dissociative item was reduction in awareness (71.5%).

To further examine the association between PTSD and dissociation we created a total severity score (by summing relevant items) for PTSD, Intrusion, Avoidance/ Numbing, Arousal, and Dissociation. We then conducted a series of correlations with these total scores and the severity scores for the individual dissociation items (cf. Table 2). As expected, PTSD severity was highly correlated with each of the PTSD symptom clusters (*r* = .82 - .93). PTSD severity correlated only moderately with Dissociation severity (*r* = .58). However, differential associations were evident for PTSD severity and individual dissociative item severity scores. The greatest degree of covariation, albeit moderate, occurred between PTSD severity and reduction in awareness (*r* = .57). PTSD severity correlated with derealization (*r* = .37) and depersonalisation (*r* = .28) to a lesser degree.

Baseline latent profile model

We specified and estimated a series of latent profile models using the 17 posttraumatic and three dissociative CAPS indicators. The resultant fit indices are shown in Table 3. In the current study values for the AIC, BIC, SSABIC fit indices were lowest for the 5-class solution and the entropy value was highest for the 5-class solution. Notably, the loglikelihood was not replicated in

the 6-class solution indicating the extraction of too many classes [38]. The corresponding profile plot is shown in Figure 1. Class 1 comprised 13.7% of the sample, class 2 comprised 20.0% of the sample, class 3 comprised 22.1% of the sample, class 4 comprised 13.7% of the sample, and class 5 comprised 30.5% of the sample. Good discrimination between classes was revealed with the average latent class probabilities for most likely latent class membership being high (class1 = .95; class 2 = .95; class 3 =.93; class 4 = .99; class 5 = .96). Both class 4 and 5 were shown to be very symptomatic classes with a high probability of endorsement across all 17 PTSD indicators relative to alternative classes. Class 4 however can be differentiated from class 5 based on class 4's higher endorsement probabilities for the dissociation indicators and the PTSD indicator C7 (Sense of Foreshortened Future). Class 3 can be regarded as an intermediate class based on the medium level of endorsement probabilities (relative to alternative classes) for both PTSD and the reduction in awareness item from the Dissociation indicators. Class 2 displayed a similar degree of endorsement to class 3 with the exception of the C4-C7, D2-D4 and RA indicators. Class 1 was shown to be the least symptomatic class with the lowest endorsement probabilities across all 20 PTSD and dissociation indicators. Based on these results, we identified class 5 to be the severe PTSD group, class 4 to be the dissociative PTSD subgroup, class 3 to be the intermediate PTSD subgroup, and class 1 and 2 to be the two low PTSD severity subgroups. Notably, no other classes relative to class 4 had any significant elevations on the Dissociative indicators of depersonalization or derealization (cf. Figure 1). Furthermore, little differences were found between classes 4 and 5 (the severe PTSD and dissociative PTSD groups) with regard to the prevalence of individuals who met PTSD diagnostic criteria; class 5 = 95.4% vs. class 4 94.9%. Relative to other classes however the prevalence of PTSD in classes 4 and 5 was substantially higher; class 3 = 72.2%, class 2 = 30.3%, and class 1 = 0%.

Latent Profiles Covariates

The 5-class solution was re-estimated with the inclusion of demographic (sex and marital status), trauma experience (5 trauma experiences queried using the LEC), and mental health/ clinical (Depression and Anxiety) covariates. The inclusion of covariates did not change the structure of the classes. Furthermore, the inclusion of covariates resulted in only minimal changes of class prevalence (C1, 13.7% vs. 14.4%; C2, 20.0% vs. 18.9%; C3, 22.7% vs. 24.0%; C4, 13.4% vs. 11.9%; C5, 31.3%, vs. 30.9%).

When comparing class 4 (the dissociative-PTSD group) to class 5 (the severe PTSD group) using class 5 as the reference group, none of the included covariates were predictive of membership in class 4; thus, none were predictive of membership in the dissociative-PTSD group compared to the severe PTSD group.

Discussion

In this study, we implemented LPA on 17 PTSD and three dissociation symptoms in a sample of highly traumatized and PTSD-symptomatic veterans. The aim of this study was two-fold; first to investigate the existence of a dissociative-PTSD subtype via latent profile analysis. Second, we aimed to explore whether certain covariates could differentiate between a dissociative-PTSD subgroup and a severe PTSD subgroup. In relation to the first aim we identified five sub-groups: two low PTSD severity classes, an intermediate PTSD class, a severe PTSD class and a dissociative-PTSD class. The dissociative-PTSD class constituted a dissociative subtype and consisted of 13.7% of the sample. For our second aim, we found that none of the included covariates of multiple demographics, trauma experiences, and depression and anxiety scores were able to predict membership in the dissociative-PTSD class compared to the severe PTSD class.

Previous studies [7-9] applying the same analytic strategy as this study, have found three rather than five latent classes. However, in spite of this disagreement, the subtype in our study is strikingly similar to the one identified in these studies: high on most PTSD symptoms and

differing from the other classes primarily on the high endorsement on the items of dissociative indicators. In our sample, this class consisted of 13.9% of the total sample. Previous studies applying the same methods have reported a dissociative-PTSD subtype proportion varying from 6-30%. Notably, the dissociative-PTSD subtype proportion has been reported as larger in female samples [9,7,8].

In addition to the latent profile analysis, we conducted a range of bivariate correlations between PTSD, PTSD symptom clusters, and dissociation items. PTSD and the individual PTSD symptoms clusters correlated highly (all *r*'s = .82-.93) as expected and PTSD correlated moderately with Dissociation (*r* = .58). Further to this, correlations between PTSD and individual dissociative items varied (all *r*'s = .28-.57), with the reduction in awareness item showing the highest correlation with PTSD. These results are much in line with the findings of Wolf et al. [8], and suggest that dissociation is not an essential facet of PTSD for most individuals, since that would have predicted higher inter-correlations between PTSD and dissociative symptoms. Combined with our findings of a distinct class characterized by very high dissociative symptomatology, this suggests that dissociation is highly salient for only a subclass of individuals, and as such supports the recent inclusion of a dissociative-PTSD subtype within the DSM-5 [15].

The dissociative-PTSD subtype within the DSM-5 is defined by dissociative symptoms of derealization and depersonalization only. However, we included an additional indicator of dissociation within our analyses; reduction in awareness. This indicator was the dissociative item most associated with PTSD (*r* = .57) and that which reflected the highest endorsement probabilities of all three dissociative items of those grouped into the dissociative-PTSD subtype. This raises questions related to whether a wider range of dissociative indicators should have been included within DSM-5's dissociative-PTSD nosology. Nevertheless, based on DSM-5, the dissociative items of derealization and depersonalization are of greatest relevance for the dissociative-PTSD subtype. This result is therefore in line with the DSM-5's conceptualization of the dissociative-PTSD subtype and in line with findings from previous research [7,8,9].

Our second aim was to explore whether certain covariates could differentiate between a dissociative-PTSD subgroup and a severe PTSD subgroup. Amongst a range of trauma experiences and demographic and clinical covariates, we found that none of the included covariates were able to differentiate between the high PTSD and the dissociative-PTSD subgroup. In discussing the current finding in relation to trauma exposures, this mirrors that of Wolf et al. [8] who reported no significant differences between the high PTSD and dissociative-PTSD groups in exposure to combat in a male only sample and total number of trauma exposures, exposure to combat, and exposure to sexual assault in a female only sample.

Looking specifically at exposure to sexual assault, our results are contrary to the results of Wolf et al. [7], who found a higher prevalence of having experienced childhood as well as adult sexual abuse by individuals in the dissociative-PTSD group. Notably, other studies of a dissociative group or subtype of PTSD have focused mainly on childhood sexual abuse, finding this to be a significant predictor of dissociative-PTSD [40,9]. Furthermore, a recent study on military sexual assault and posttraumatic sequelae found a relationship between sexual assault and symptoms of complex PTSD, including dissociative symptoms [41]. The authors found this association to be present even when controlling for childhood sexual abuse, highlighting a specific role of military sexual assault over and above childhood sexual abuse when predicting dissociation. Therefore, even though our study did not find that sexual assault was able to significantly differentiate between PTSD and dissociative-PTSD, the existing literature suggests that adult sexual assault may be a relevant predictor of dissociation in PTSD, and thus potentially predictive of membership in a dissociative-PTSD subtype. Ambiguity in findings across studies may be attributable to a number of factors; for example, different rates of sexual assaults in the study samples [7], and the different methodological and analytical techniques which are being used.

The present study confirms our hypothesis of a dissociative-PTSD subtype. Even though our total number of subgroups differed from earlier studies, our findings are in line with previous subtype studies and with a recent review by Dalenberg and Carlson [17], who found that

most of the extant evidence favors a subtype model of dissociation in PTSD. The distinction of a highly dissociative-PTSD subgroup is of high clinical relevance. As seen from our study, and in line with previous research, high levels of dissociation are related to high levels of PTSD, indicating severe psychopathology in need of attention. Moreover, assessing dissociation in traumatized individuals will be an important step towards tailoring treatments for individual PTSD profiles. Further investigation of factors which may be predictive of membership in a dissociative-PTSD subtype will help to identify particular individuals with particular histories/characteristics whom are at the greatest risk for the development of dissociative-PTSD. It remains uncertain if standard and novel PTSD treatments are as efficient for individuals experiencing dissociative-PTSD compared to those PTSD patients with low (if any) levels of dissociation [42]. This is a matter deserving more research attention. Furthermore, Braakman, Kortmann, and Van den Brink [43] proposed that in truly identifying if a diagnostic entity is valid, researchers and clinicians must examine aspects of the disorder such as whether it has distinctive biological correlates, a distinctive response to treatment, and a distinctive course. Future research in relation to the dissociative-PTSD subtype should endeavor to address these issues.

Certain limitations must be taken into account when interpreting the results of this research. First, all patients were assessed by the same clinician; co-author J. D. Richardson. Hence, it is not possible to assess the reliability of the assessments. Furthermore, the results of the PTSD and dissociation assessments are fully dependent on a single assessor's conceptualization of the symptoms. Second, the study was retrospective and sometimes relied on memories of traumas and traumatic reactions in a rather distant past. In addition, it is possible that individuals assigned to the dissociative-PTSD subtype are over-reporting their distress; particularly given a large literature base highlighting a significant association between dissociation and suggestibility [44]. Future studies should attempt to control for this association within their analyses. Furthermore, our sample consisted solely of veterans, which renders the generalizability to other trauma groups uncertain. This is particularly important when extending the evidence in support of the inclusion of a

dissociative-PTSD subtype in the DSM-5; given that the diagnostic criteria for PTSD and a dissociative-PTSD subtype are based on responses to various traumas. Finally, the traumatic events investigated here were war related, of a physical or sexual nature, and exclusive to adulthood, and thus did not cover traumas which were previously found to relate to dissociation; such as childhood sexual abuse. A more thorough investigation of factors which may relate to dissociative-PTSD will add significant knowledge on the etiology of dissociative-PTSD. This study provided data from a large sample of clinically assessed veterans, utilizing the CAPS, a gold standard for PTSD assessment, thus is a valuable addition to the existing knowledge base on the dissociative-PTSD subtype.

Conflict of Interest Statement:

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Table 1.

Level of trauma exposure across the 16 LEC items for the total sample

Traumatic Experiences (LEC items)	%
1. Natural disaster (i.e., flood, hurricane, tornado, earthquake).	56.5
2. Fire or explosion.	75.2
3. Transportation accident (i.e., car accident, boat accident, train wreck, plane crash).	78.9
4. Serious accident at work, home, or during recreational activity.	60.9
5. Exposure to toxic substance.	49.5
6. Physical assault.	65.7
7. Assault with a weapon (i.e., being shot, stabbed, threatened with a knife, gun, bomb).	73.4
8. Sexual assault (i.e., attempt to rape, made to perform any type of sexual act through force or threat of harm).	23.4
9. Other unwanted or uncomfortable sexual experience.	21.8
10. Combat or exposure to a war zone (in the military or as a civilian).	80.8
11. Captivity (i.e., being kidnapped, abducted, held hostage, prisoner of war).	28.5
12. Experienced a life threatening illness or injury.	58.8
13. Witnessed severe human suffering.	73.8
14. Witnessed sudden, violent death (i.e., homicide, suicide).	63.0
15. Sudden, unexpected death of someone close to you.	75.7
16. Serious injury, harm, or death you caused to someone else.	34.5

Note. Categories are not mutually exclusive

Table 2.

Association between PTSD, PTSD symptom clusters, dissociation and individual dissociation items severity scores.

	PTSD	Intrusion	Avoidance/ Numbing	Arousal	Dissociation	Reduction in Awareness	Derealisation
PTSD	1						
Intrusion	.82	1					
Avoidance/Numbing	.93	.62	1				
Arousal	.88	.60	.75	1			
Dissociation	.58	.38	.57	.57	1		
Reduction in awareness	.57	.35	.56	.59	.84	1	
Derealisation	.37	.27	.36	.34	.73	.40	1
Depersonalization	.28	.18	.29	.26	.60	.29	.19

Note. All correlations are significant at the 0.01 level (two-tailed).

Table 3.

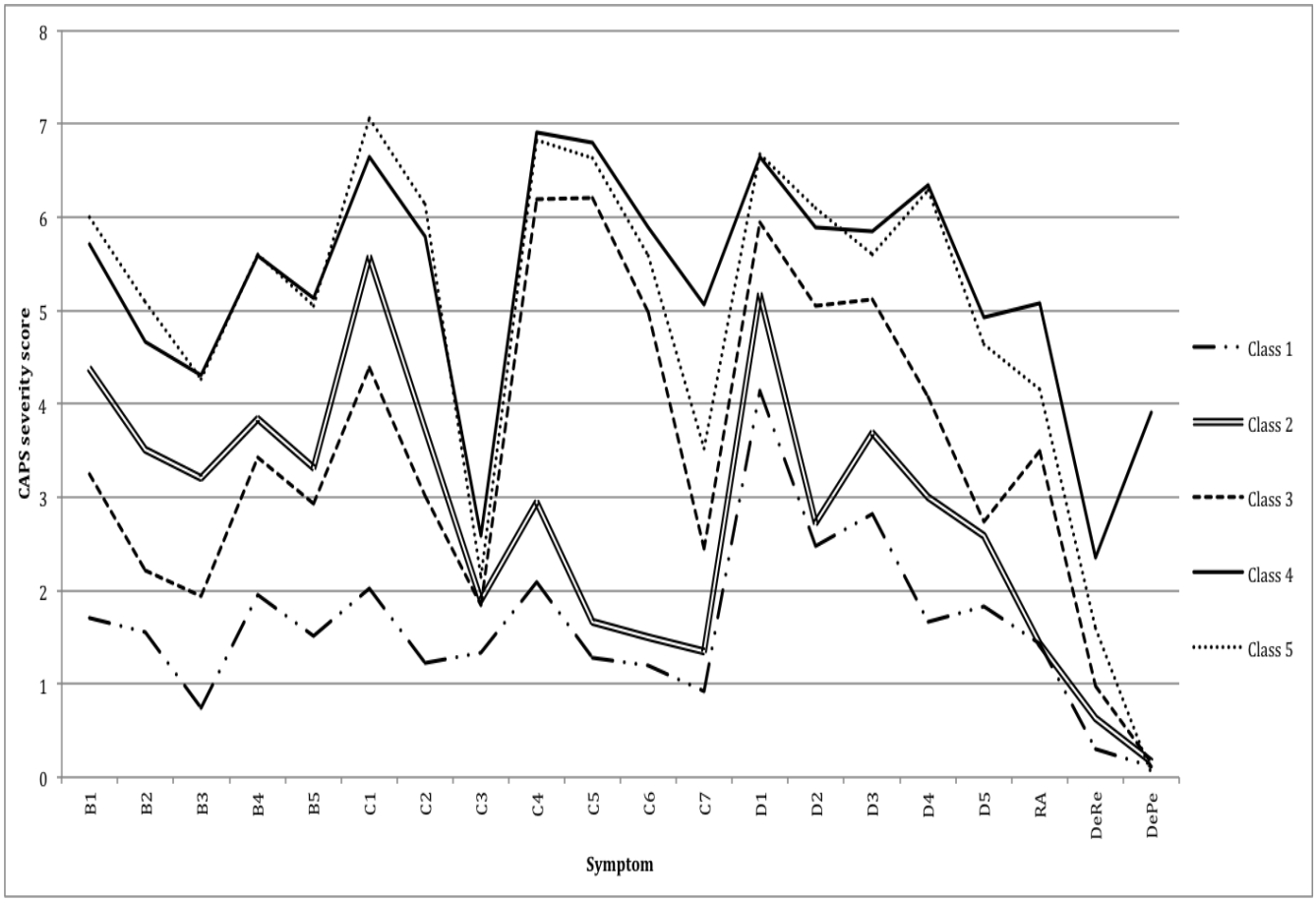
Fit indices for competing latent profile models in the absence of covariates

	AIC	BIC	SSABIC	Entropy	BSLRT (p)
2C	36699.116	36947.290	36753.711	0.922	2192.382 0.000
3C	36084.532	36418.143	36157.921	0.915	656.584 0.000
4C	35776.059	36195.107	35868.243	0.926	350.473 0.000
5C	35550.946	36055.431	35661.925	0.932	267.113 0.000
6C	/	/	/	/	/

Note. AIC = Akaike information criterion; BIC = Bayesian Information Criterion; SSABIC = sample size adjusted Bayesian information criterion; BSLRT (p) = Bootstrapped likelihood ratio test value and associated significance level. The best logliklihood was not replicated for the 6c model suggesting the extraction of too many classes.

Figure 1.

Five-class latent profile plot of PTSD and dissociative indicators.



Note: B1-D5 represents the individual PTSD symptoms as described in DSM-IV. RA= reduction of awareness, DeRe=Derealization, DePe=Depersonalization. CAPS severity score is calculated as a combination score of the frequency and intensity values.